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Ratchet driver for socket spanners - allows adjustment to drive in either direction and to ratchet in opposite direction

GORDON TOOLS LTD 14.02.76-GB-005905

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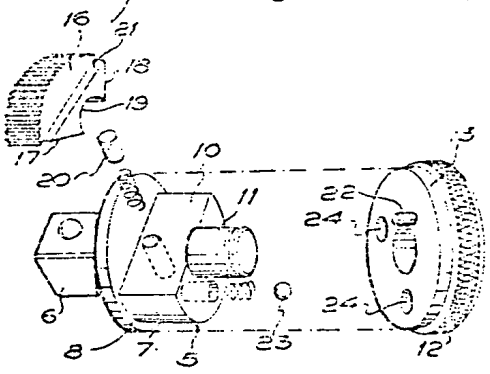
The ratchet driver has a driving portion with a cylindrical bore receiving a relatively rotatable driven portion having a shoulder (10) capable of contacting either of two relatively inclined faces (17, 18) on an intermediate portion (16) on the driven portion. The driven portion can be rotated in either direction and can ratchet in the reverse direction depending on the shoulder contacted.



The intermediate portion ismovable to allow rotation of the driving portion relative to the driven portion and is spring urged away from the shoulder. The intermediate portion is moved by a further portion (12) rotatable relative to the driving portion. 7.4.77. (6pp063)

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(72) Inventor ANTHONY ETCHES

(19)

(54) IMPROVEMENTS IN OR RELATING TO RATCHET DRIVERS

(71) We, GORDON TOOLS LIMITED, a British Company of Rockingham Street, Sheffield, S1 3NY, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to ratchet devices, i.e., devices incorporating a driving and a driven member with interposed means allowing rotational movement of the driving member in one direction to be imparted to the driven member and the driven member to remain stationary while the driving member is subjected to rotational movement in the opposite direction.

In the main, ratchet drivers form devices intended to rotate fasteners such as nuts and bolts, or screws as a means of tightening or loosening them, without the need to remove the device from the nut, bolt or screw. Therefore, it is usual to form the interposed means between the driving and driven members such that clockwise or anticlockwise rotational movement of the driving member can be imparted to the driven member as may be required to either tighten or loosen a nut, bolt or screw.

Hitherto, devices such as spanners, drive members for socket-spanners or screw drivers have tended to be provided with interposed means between the driving member (e.g., a hand grip or handle) and the driven member (e.g., a spanner like end piece, a shank to fit a socket spanner, or a screw driver blade) that has tended to be relatively complex and relatively expensive, but more importantly which has tended to be the weakest part of the device. Equally importantly, devices known hitherto have not been readily capable, if capable at all, of allowing the driven member to be manually rotated independently of the driving member, and which would be highly advantageous by allowing a nut, bolt or screw to be rapidly rotated to a "finger tight" condition following which the hand grip or handle would be utilised to effect final tightening, or to allow the hand grip or handle to be used to effect an initial lossening of the nut, bolt or screw and then a rapid removal of it.

According to the present invention a ratchet driver comprises a driving member having a cylindrical bore, a driven member fitted in the bore and capable of rotation relative to the driving member, the driven member being formed with a diametral shoulder, and interposed member located on the driven member and having two relatively inclined faces adapted to be selectively abutted by opposite ends of the shoulder, the interposed member being spring urged away from the shoulder, means on the interposed member adapted under the bias of the spring to reasonably engage in a torque transmitting manner co-operating means on the inside face of the cylindrical bore, and further means on the driver capable of rotation with respect to the driving member to engage the interposed member to disengage it from the means on the inside face of the cylindrical bore and move it from one position where one inclined face can be abutted by one end of the shoulder to allow the driving member to drive the driven member in one direction and allow the driving member to rachet in the reverse direction, to a second position where the other inclined face can be abutted by the other end of the shoulder to allow re-engagement with said means on the inside face of the cylindrical bore and the driving member to drive the driven member in the opposite direction and again allow the driving member to ratchet in the respective reverse direction, said further means also being capable of engaging the interposed

member to disengage it from the means on the inside face of the cylindrical bore to allow rotation of the driving member with respect to the driven member, and to move the interposed member so that either inclined face abuts the shoulder to cause rotation of the driven member with respect to the driving member by rotation of the said further means.

Thus, with the driving member being secured to or integral with a hand grip or handle, and with the driven member formed with means to engage, e.g., a nut or bolt head, a shaft to engage a socket spanner, or a screwdriver blade, the interposed member can be set such that rotation of the driving member causes the driven member to rotate with the driving member. When the direction of rotation of the driving member is reversed, the said further means engages with the interposed means to cause it to disengage from the inside face of the cylindrical bore, to allow the driven member to remain stationary whilst the driving member is ratcheted in the opposite direction.

Preferably, the interposed member is a ratchet pawl, having the two relatively inclined faces extending to opposite ends of an arcuate surface which arcuate surface has the same radius of curvature as that of the cylindrical bore. It is further preferred that the arcuate surface is formed with a number of teeth adapted to mesh with corresponding teeth around the periphery of the cylindrical bore.

With the device in the form of a drive member for socket spanners, the said further means to adjust the position of the ratchet pawl may simply comprise an end cap rotatably mounted on one (rearward) end of the driven member, the cap being provided with a peg extending into the cylindrical bore to contact the ratchet pawl. Thus a side face of the ratchet pawl towards the end cap may be provided with a transverse chordal shoulder against which the peg can engage. Thus, rotation of the cap with respect to the driven member causes arcuate movement of the peg until it contacts the shoulder on the ratchet pawl. Continued rotation of the cap causes the peg to press down on the shoulder, first to disengage the teeth and then to pivot the ratchet pawl so that the selected inclined face on the pawl is brought into close proximity to the shoulder on the driven member.

To locate the driven member within the cylindrical bore of the driving member, the driven member may be formed with an annular shoulder towards one (rearward) end and the cylindrical bore formed with an annular shoulder towards one (forward) end. Thus, the driven member can be inserted in the bore until the annular shoulders abut.

With the device in the form of a drive member for socket spanners, the end cap rotatably mounted on the rearward end of the driven member may be of a diameter to bear against the rearward end of the driving member, and the driven member is positively held within the cylindrical bore.

A short shaft at the rearward end of the driven member may be provided on which the cap is rotatably mounted, and the ratchet pawl can be provided with an arcuate recess so that it also may be mounted on that shaft..

To provide for positive location of the cap in each of its two positions, means may be provided to provide positive location of the cap. Thus, a spring loaded detent can be provided on the cap to engage in a corresponding recess in the driven member, or vice versa.

One embodiment of the invention will now be described with reference to the accompanying drawings in which;

Figures 1 to 3 are respectively, a front elevation, rear elevation and side elevation of a socket spanner ratchet driver in accordance with the invention;

Figure 4 is an exploded perspective view of the ratchet driver of Figure 1; and

Figures 5 and 6 are, respectively, views corresponding to Figure 1 with parts removed for clarity and showing the ratchet driver in two alternative operative positions.

In the drawings, a ratchet driver 1 for socket spanners (not shown) has a driving member in the form of a generally annular head 2 having a central cylindrical toothed bore 3, secured to an elongate handle 4. Fitted in the cylindrical bore 3 is a driven member 5 formed by a forwardly extending square sectioned shank 6 mounted on a cylindrical body portion 7 having an annular flange 8 fitting a locating recess 9 on the head. The body portion has a diametral shoulder 10 beyond which is a rearwardly directed circular sectioned mounting bar 11 on which is pivotally mounted an end cap 12 having an annular shoulder 13 fitting a locating recess 14 rearwardly of the head. The end cap 12 is secured in place by a circlip 15.

Located on the diametral shoulder 10 is an interposed member 16 in the form of a pawl of part cylindrical form with relatively inclined faces 17, 18, the pawl having a toothed profile on its outer part-cylindrical periphery and a part cylindrical recess 19 at the junction of the inclined faces in which locates a spring loaded pin 20 lying in a recess in the shoulder 10. The pawl itself has a transverse chordal shoulder 21 and the end cap has an inwardly directed projection 22 adapted to contact the shoulder 21. The spring loaded pin 20 acting on

the pawl serves to urge the pawl into contact with the toothed bore of the driving head and a spring loaded detent 23 engages in one of two recesses 24 on the inside face of the cap to hold the cap in one or other of its operative positions as will now be explained.

Thus, with the cap pivoted in anticlockwise manner the projection 22 engages the shoulder 21 to the left of the pivot axis of the driven member. Contact between the projection and the pawl urges the pawl out of engagement with the teeth in the bore 3 and allows the pawl to be pivotted on the shoulder 10, to bring the face 17 of the pawl into close proximity to the transverse shoulder 10 on the driven member as is shown in Figure 5, and the spring loaded detent 23 engages one of the recesses 24 on the cap to hold the cap and hence the projection 22 in that position. With the driving head subjected to anti-clockwise movement, the shoulder 10 is engaged by the inclined face 17 on the pawl and with the teeth on the pawl in engagement with the teeth in the bore 3, anti-clockwise movement is transmitted to the driven member 5 and hence a socket spanner (not shown) engaging the square sectioned shank. Clockwise movement of the driving head brings the shoulder 21 on the pawl into contact with the projection 22 on the cap, to draw the teeth on the pawl out of engagement with the teeth on the bore to allow continued clockwise movement (ratcheting) of the driving head with the driving member held stationary.

To provide for opposite driving and ratcheting, the cap 12 is rotated clockwise from its Figure 5 position, when the projection 22 is brought into contact with the shoulder 21 at the opposite side of the pivot axis of the driven member, to urge the pawl out of engagement with the toothed bore 3, pivot the pawl on shoulder 10 and bring the face 18 of the pawl into close proximity with the shoulder 10 of the driven member, and the spring loaded detent 23 engages the other recess 24 on the inside face of the cap as is shown by Figure 6. In this position, clockwise movement of the driving head urges the pawl face 18 against the shoulder 10 and with the pawl teeth in engagement with the toothed bore, and continued clockwise movement then causes clockwise driving of the driven member and thus a socket spanner (not shown) on the square shank. Anticlockwise movement of the driving head brings the projection 22 into contact with the shoulder 21 on the pawl to disengage the pawl from the toothed bore, and continued anticlockwise movement of the driving member (ratcheting) can occur with the driven member and hence a socket spanner on the square shank stationary.

When the end cap is in the position shown in Figure 6, in addition to allowing ratcheting of the driving member, there is also provided the facility for driving the driven member by the end cap itself. Thus by rotating the end cap in the clockwise direction, the projection 22 engages the shoulder 21 on the pawl to disengage the pawl from the toothed bore 3 against the action of the spring loaded pin 20 and continued clockwise rotation drives the face 18 on the pawl against the shoulder 10 on the driven member to drive the driven member in the clockwise direction. Similarly with the end cap in the position shown in Figure 5, anticlockwise rotation of the cap causes the projection 22 to engage the shoulder 21 on the pawl to disengage the pawl from the toothed bore 3 against the action of the spring loaded pin 20 to urge the face 17 on the pawl against the shoulder 10 on the driven member and when continued anticlockwise movement of the cap drives the driven member in an anticlockwise direction. This facility then allows for the rapid finger untightening of a nut or bolt engaged by socket on the square shank; and similarly in the opposite position a nut or bolt can be rapidly tightened by hand utilising the cap, followed by final tightening by driving the driving member as has been described above.

WHAT WE CLAIM IS

1. A ratchet driver comprising a driving member having a cylindrical bore, a driven member fitted in the bore and capable of rotation relative to the driving member, the driven member being formed with a diametral shoulder, an interposed member located on the driven member and having two relatively inclined faces adapted to be selectively abutted by opposite ends of the shoulder, the interposed member being spring urged away from the shoulder, means on the interposed member adapted under the bias of the spring to releasably engage in a torque transmitting manner co-operating means on the inside face of the cylindrical bore, and further means on the driver capable of rotation with respect to the driving member to engage the interposed member to disengage it from the means on the inside face of the cylindrical bore and move it from one position where one inclined face can be abutted by one end of the shoulder to allow the driving member to drive the driven member in one direction and allow the driving member to ratchet in the reverse direction, to a second position where the other inclined face can be abutted by the other end of the shoulder to allow re-engagement with said means on the inside

face of the cylindrical bore and the driving member to drive the driven member in the opposite direction and again allow the driving member to ratchet in the respective reverse direction, said further means also being capable of engaging the interposed member to disengage it from the means on the inside face of the cylindrical bore to allow rotation of the driving member with respect to the driven member, and to move the interposed member so that either inclined face abuts the shoulder to cause rotation of the driven member with respect to the driving member by rotation of the said further means.

2. A ratchet driver as in Claim 1 wherein the driving member is secured to or integral with a hand grip or handle.

3. A ratchet driver as in Claim 1 or Claim 2 wherein the interposed member is a ratchet pawl, having the two relatively inclined faces extending to opposite ends of an arcuate surface which arcuate surface has the same radius of curvature as that of the cylindrical bore.

4. A ratchet driver as in Claim 3 wherein the arcuate surface is formed with a number of teeth adapted to mesh with corresponding teeth around the periphery of the cylindrical bore.

5. A ratchet driver as in any of Claims 1 to 4 wherein the said further means to adjust the position of the interposed member is an end cap rotatably mounted on one (rearward) end of the driven member, the cap being provided with a peg extending into the cylindrical bore to contact the interposed member.

6. A ratchet driver as in Claim 3, Claim 4 or Claim 5 when appended to Claims 3 and 4 wherein the side face of the ratchet pawl towards the end cap is provided with a transverse chorded shoulder against which the peg can engage.

7. A ratchet driver as in any of Claims 1 to 6 wherein the driven member is formed with an annular shoulder towards one (rearward) end and the cylindrical bore formed with an annular shoulder towards one (forward) end in which the annular shoulder locates.

8. A ratchet driver as in Claim 5, Claim 6 or Claim 7 when appended to Claim 5 wheren the end cap is rotatably mounted on a short shaft at the rearward end of the driven member and means are provided to positively locate the cap and thus the peg in relation to the interposed member.

9. A ratchet driver as in Claim 8 wherein a spring loaded detent is provided on the cap to engage in a corresponding recess in the driven member or vice versa.

10. A ratchet driver as in any of Claims 1 to 9 wherein a spring loaded peg is provided in a recess in the diametral shoulder on the driven member, which engages below the interposed member to urge it away from the shoulder.

11. A ratchet driver substantially as hereinbefore described with reference to the accompanying drawings.

HULSE & CO.
Chartered Patent Agents,
Cavendish Buildings,
West Street,
Sheffield S1 1ZZ.

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1559093 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

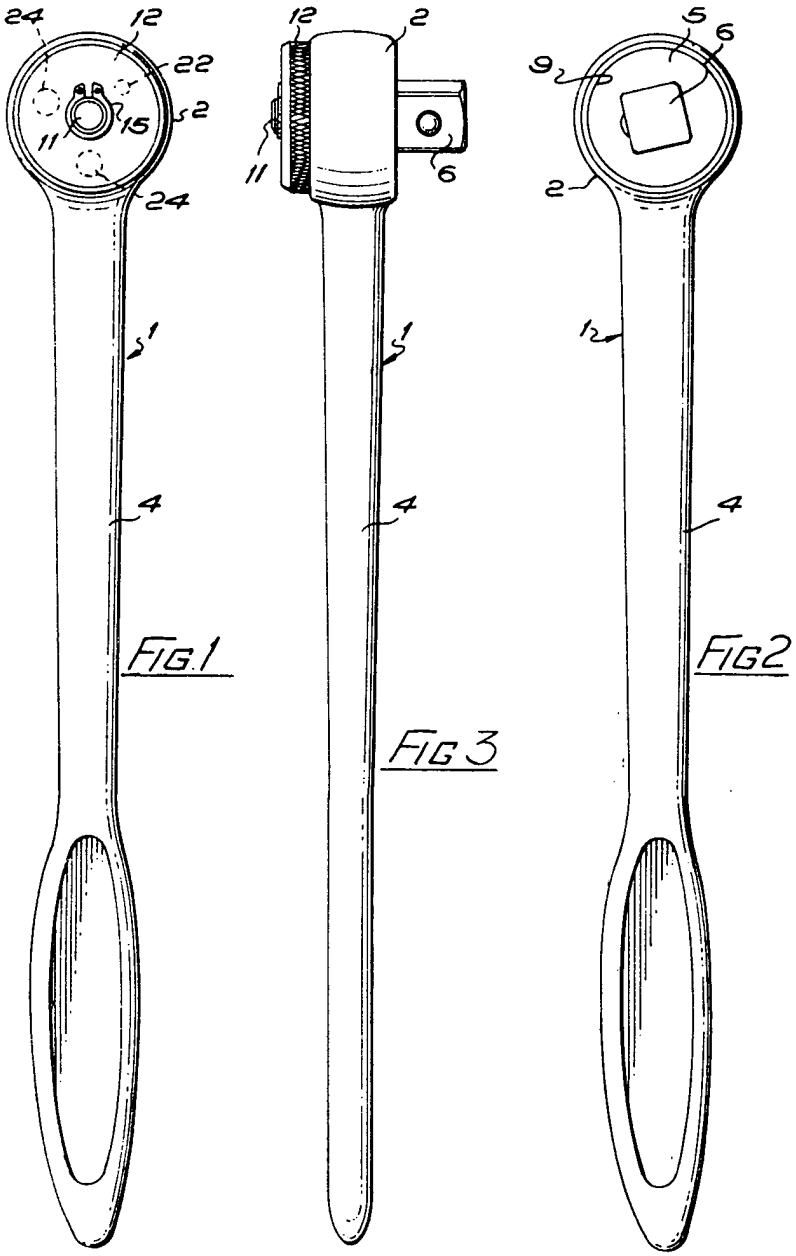

FIG.1

FIG 3

FIG2

1559093 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

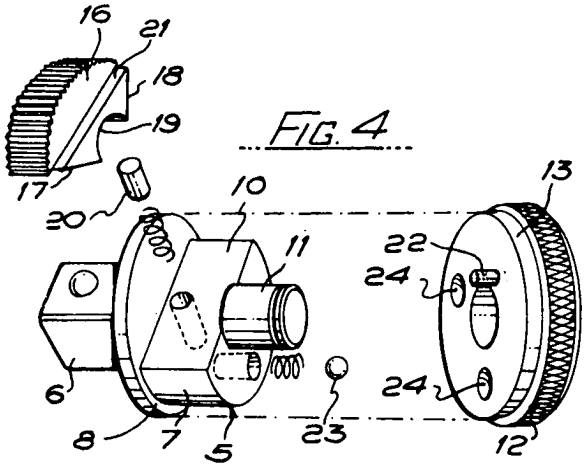

FIG. 4

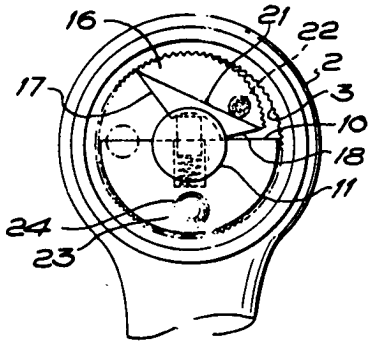

FIG. 6

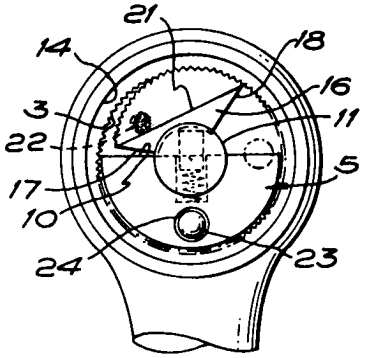

FIG. 5